

Specifications

A gas analyzer is required for the measurement of gas phase formaldehyde and water vapor. This analyzer will be used for the calibration of an aircraft based formaldehyde detector under development at NASA. The gas analyzer must be highly sensitive, highly accurate, and have a fast time response to meet the needs of the NASA detector calibration. This Gas Analyzer must be capable of simultaneously analyzing at least 30 gases in parts per billion by volume (ppbv) to % levels. The primary focus is Formaldehyde. The instrument must be capable of measuring concentrations of formaldehyde in the range of a few ppbv (<40 ppbv in <5 minutes, <600 ppbv in 1 second). The secondary focus is H₂O. The instrument must be capable of measuring H₂O to a few ppbv (< 30 ppbv in 2 minutes). These capabilities must be demonstrated, preferably using an acceptable standard, eg EPA, or independent testing facility.

The Gas Analyzer must be based on Fourier Transform Infrared (FTIR) spectrometry. The FTIR spectrometer must provide high resolution (<1 cm⁻¹) and fast scanning (1 scan/sec at <1 cm⁻¹ resolution). The analyzer must have an integrated sampling cell composed of materials compatible with the detection of trace formaldehyde and water vapor without removal of the sample on the walls of the detection cell. The cell must be constructed of low reactivity, high purity metal, eg electropolished 316 SS or nickel coated aluminum. The cell must have metal seals. The internal volume of the sample cell must be small, 0.25 +/- 0.25 liters, to enable fast sampling time response (<1 s) at low pressures (5 – 500 torr) and small pumping speeds (~ 0.5 liter/s). No pump is required. The connections to the analyzer must be compatible with high purity sampling, eg Swagelok VCR fittings.

The analyzer must be capable of operating at reduced pressure (5 – 500 torr) and have built in pressure correction using an absolute pressure transducer. The sample inlet must be heated with a user defined temperature set point. The analyzer must have built in temperature control and temperature correction. The analyzer detector housing must be fully purged to enable accurate measurement of sub ppmv of H₂O. The analyzer must be portable, rugged, vibration-tolerant, and resistant to optical misalignment. The system must be user serviceable without the need to recalibrate.

The analyzer must be provided with analysis software and libraries of reference spectra for common trace gases. The analyzer must be supplied with a method to measure ppbv levels of formaldehyde and H₂O based on multiple point calibrations. The analysis must be based on a least squares regression or equivalent preferably with capabilities for dynamic calibrations, mutation spectrum calibration, quantitative error analysis, and full residual analysis with species identification. The instrument control and analysis must be compatible with National Instruments LabView software. Built in LabView drivers are preferred.

The analyzer should include full on-site installation and training and technical support for the duration of the instrument operation. The system should be supplied with 12 months parts and labor warranty for factory defect.